

THE CLAIMS

What is claimed is:

5       1. A golf ball comprising a core and a cover layer, wherein at least one of the core or cover  
layer comprises a plasticized polyurethane composition comprising at least one polyurethane  
material and at least one plasticizer.

10      2. The golf ball of claim 1, wherein the plasticizer is selected from the group consisting of  
alkyl adipates, alkyl phthalates, alkyl azelates, alkyl benzoates, alkyl citrates, soy and linseed  
oils, and mixtures thereof.

15      3. The golf ball of claim 2, wherein the plasticizer is dialkyl phthalate.

20      4. The golf ball of claim 1, wherein the plasticizer is comprises C<sub>3</sub>-C<sub>10</sub> dialkyl adipates, C<sub>3</sub>-  
C<sub>10</sub> dialkyl phthalates, or acetyl tributyl citrate.

25      5. The golf ball of claim 1, wherein the plasticizer comprises dibutyl phthalate, bis(2-  
ethylhexyl) phthalate, diisopropyl adipate, dibutyl adipate, bis(2-ethylhexyl) adipate, acetyl  
tributyl citrate, or a mixture thereof.

30      6. The golf ball of claim 1, wherein the plasticized polyurethane composition comprises a  
foamable polyurethane compound produced by the reaction of a polyol and toluene diisocyanate,  
an amount of a non-halogen containing foaming agent sufficient to produce a foam from the  
polyurethane compound, and a non-halogen containing plasticizer selected from the group  
consisting of phthalate plasticizers and phosphate ester plasticizers.

35      7. The golf ball of claim 6, wherein the non-halogen containing foaming agent is water or a  
non-halogen containing gas.

40      8. The golf ball of claim 7, wherein the non-halogen containing foaming agent is water.

9. The golf ball of claim 1, wherein said non-halogen containing plasticizer is a phosphate ester.

5 10. The golf ball of claim 9, wherein said phosphate ester comprises 2-ethylhexyl diphenyl phosphate, isodecyl diphenyl phosphate, mixed dodecyl and tetradecyl diphenyl phosphate, trioctyl phosphate, tributyl phosphate, butylphenyl diphenyl phosphate, isopropylated triphenyl phosphate, or a mixture thereof.

10 11. The golf ball of claim 10, wherein the phosphate ester comprises 2-ethyl hexyl diphenyl phosphate and isodecyl diphenyl phosphate.

15 12. The golf ball of claim 6, wherein the phthalate plasticizer comprises diisononyl phthalate, dihexyl phthalate, diheptyl phthalate, butyl octyl phthalate, linear dialkyl phthalate wherein the alkyl groups are independently carbon chains having from seven to eleven carbon atoms, and butyl cyclohexyl phthalate.

20 13. The golf ball of claim 6, wherein the non-halogen containing plasticizer is an alkyl aryl phthalate.

14. The golf ball of claim 13, wherein the alkyl aryl phthalate comprises butyl benzyl phthalate, alkyl benzyl phthalate wherein said alkyl group has a carbon chain having from seven to nine carbon atoms, and texanol benzyl phthalate.

25 15. The golf ball of claim 1, wherein the composition further comprises synthetic polyisoprene, natural polyisoprene, polybutadiene, butyl rubber, polynorbornene, ethylene-propylene diene monomer rubber, or styrene-butadiene rubber, combined with high levels of oils, plasticizers, fillers, and mixtures thereof.

30 16. The golf ball of claim 1, wherein the core comprises a center and an outer core layer.

17. The golf ball of claim 16, wherein at least one of the center or the core layer comprises the plasticized polyurethane.

18. The golf ball of claim 1, wherein the cover comprises an inner cover layer and an outer  
5 cover layer.

19. The golf ball of claim 18, wherein at least one of the inner or outer cover layers comprises the plasticized polyurethane.

10 20. The golf ball of claim 19, wherein at least one of the inner or outer cover layer has a thickness of less than about 0.05 inches.

15 21. The golf ball of claim 1, wherein the core has an outer diameter of at least about 1.55 inches.

22. The golf ball of claim 21, wherein the core has an outer diameter of between about 1.57 inches and about 1.62 inches.

20 23. The golf ball of claim 1, wherein the plasticizer comprises phthalic acid esters; aliphatic dibasic acid esters; trimellitate esters; fatty acid esters; benzoic esters; aliphatic phosphates; aromatic phosphates; halogenated aliphatic phosphates; and mixtures thereof.

24. The golf ball of claim 1, wherein the plasticizer comprises a hydrophobic plasticizer.

25 25. The golf ball of claim 24, wherein the hydrophobic plasticizer comprises aromatic esters selected from the group consisting of dibutyl phthalate, dioctyl phthalate, diheptyl phthalate, bis (2-ethylhexyl) phthalate, dicyclohexyl phthalate, butyl lauryl phthalate, diisooctyl phthalate, butylcoconutalkyl phthalate, ditridecyl phthalate, dilauryl phthalate, diisodecyl phthalate, butylbenzyl phthalate, octyldecanoyle phthalate, dimethylglycol phthalate, ethylphthalyl ethylene glycolate, methylphthalyl ethylene glycolate, butylphthalyl ethylene glycolate, dinonyl phthalate, diheptyl phthalate, octyldecyl phthalate, ditridecyl phthalate, dicapryl phthalate, bis(3,5,5-

trimethylhexyl) phthalate, iso octylisodecyl phthalate, bis(diethyleneglycolmonomethylether) phthalate, and benzphenol.

26. The golf ball of claim 24, wherein the hydrophobic plasticizer comprises aliphatic esters  
5 selected from the group consisting of mono-, di-, or polyester of higher fatty acid having 8 or  
more carbons with di-, tri-, or polyhydric alcohol, glycerin monostearate, glycerin 12-hydroxy  
stearate, glycerin distearate, diglycerin monostearate, tetraglycerin monostearate, glycerin  
monolaurate, diglycerin monolaurate, tetraglycerin monolaurate, polypropylene adipate,  
diisodecyl adipate, bis(2-methylhexyl) adipate, dicapryl adipate, diisoctyl adipate, octyldecyl  
10 adipate, iso octylisodecyl adipate, dibutyl fumarate, dioctylfumarate, triethyl citrate, acetyltriethyl  
citrate, tributyl citrate, and acetyltributyl citrate.

27. The golf ball of claim 24, wherein the hydrophobic plasticizer comprises phosphate esters  
selected from the group consisting of tricresyl phosphate, phenyldicresyl phosphate,  
15 xylenyldicresyl phosphate, cresyldixylenyl phosphate, triphenyl phosphate, tributyl phosphate,  
trichloroethyl phosphate, trioctyl phosphate, tributyl phosphate, trichloroethyl phosphate, trioctyl  
phosphate, triethyl phosphate, and arylalyl phosphate.

28. The golf ball of claim 24, wherein the hydrophobic plasticizer comprises epoxy  
compounds selected from the group consisting of butylepoxy stearate, octylepoxy stearate,  
20 epoxybutyl oleate, epoxidized butyl oleate, epoxidized soybean oil, epoxidized linseed oil,  
epoxidized alkyl oil, and epoxidized alkyl oil alcohol ester; and mixtures thereof.

29. The golf ball of claim 1, wherein the plasticizer is selected from the group consisting of  
25 alkyl adipates, alkyl phthalates, alkyl azelates, alkyl benzoates, alkyl citrates, similar soy and  
linseed oils, C<sub>3</sub>-C<sub>10</sub> dialkyl adipates, C<sub>3</sub>-C<sub>10</sub> dialkyl phthalates, acetyl tributyl citrate, dibutyl  
phthalate, bis(2-ethylhexyl) phthalate, diisopropyl adipate, dibutyl adipate, bis(2-ethylhexyl)  
adipate, acetyl tributyl citrate, phthalates, adipates, sebacates, azelates, trimellitates, glutarates,  
benzoates, alkyl alcohols, phosphates, and mixtures thereof.

30. The golf ball of claim 1, wherein the polyurethane composition comprises a saturated polyurethane.

31. The golf ball of claim 1, wherein the polyurethane composition comprises a UV absorber  
5 or a light stabilizer.